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ABYC
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51

FIFTY ONE
ISO 9001

OPTIMUS EPS BY SEASTAR

BAYSTAR™

SEASTAR™

OPERATION INSTRUCTIONS

AND USER'S MANUAL

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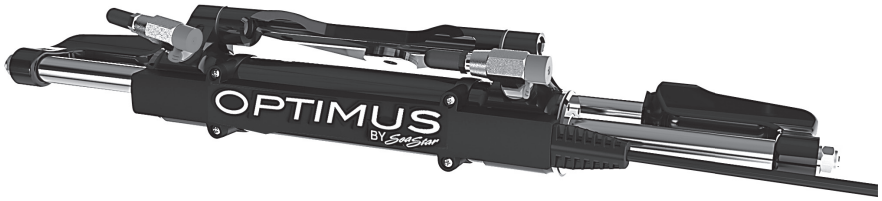

OPTIMUS EPS
BY SEASTAR™

Electronic Power Steering for
Outboard Powered Vessels

SEASTAR
SOLUTIONS®

Before you do it your way,
please try it our way

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California
Proposition 65 Warning

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and reproductive ham.

Wash hands after handling.

Thank you for choosing an Optimus™ Electronic Power Steering System by SeaStar Solutions. You have chosen a state of the art steering system that will provide years of effortless and trouble free steering performance.

About this Book

This User's manual contains the information you need to safely operate and maintain your steering system. It must remain on the boat.

Notice to the Operator

Throughout this publication, Dangers, Warnings and Cautions (accompanied by the International Hazard Symbol ⚠) are used to alert the user to special instructions concerning a particular service or operation that may be hazardous if ignored or performed incorrectly or carelessly. **Observe them carefully!**

These safety alerts alone cannot eliminate the hazards that they signal. Strict compliance with these special instructions during installation, operation, and maintenance, plus common sense operation, are important measures to prevent accidents.

Failure to adhere to these notices may result in the loss of steering control, leading to possible ejection from the vessel, causing property damage, injury and/or death.

⚠ DANGER — **IMMEDIATE HAZARDS WHICH, IF NOT ACTED UPON, WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH.**

⚠ WARNING — **HAZARDS OR UNSAFE PRACTICES WHICH, IF NOT ACTED UPON, COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH.**

⚠ CAUTION — **Hazards or unsafe practices which could result in minor injury or product or property damage.**

NOTICE — *Information which is important to proper use or maintenance, but is not hazard-related.*

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ABBREVIATIONS

The following abbreviations are used in this manual:

ABYC	American Boat & Yacht Council
AP	Autopilot
CAN	Controller Area Network
EPS	Electronic Power Steering
GPS	Global Positioning System
INFO	Information
HI	High
LO	Low
MPH	Miles Per Hour
NMEA	National Marine Electronics Association
NMEA 2000®	A protocol for digital communication on a CAN Bus
PCM	Pump Control Module
RPM	Revolutions Per Minute
STBD	Starboard (right)

Note: Some abbreviations not listed here may be found in their respective sections.

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1.0 SAFETY INFORMATION

⚠ WARNING

THE SAFETY INFORMATION PROVIDED BELOW IS INTENDED TO INFORM YOU OF THE DANGERS THAT MAY BE PRESENT BEFORE, DURING AND AFTER USE. IT IS CRITICAL THAT YOU READ AND UNDERSTAND ALL THE POINTS NOTED.

⚠ WARNING

THE OPTIMUS EPS SYSTEM MUST ONLY BE INSTALLED BY AN AUTHORIZED DEALER OR OEM.

Safe operation of the steering system depends upon proper installation and maintenance of the system, and the common sense, safe judgment, knowledge, and expertise of the operator. Every installer and operator of the steering system should know the following requirements before installing or operating the steering system.

If you have any questions regarding any of these warnings, contact SeaStar Solutions.

To reduce the risk of severe injury or death:

1. Always wear a Coast Guard Approved personal flotation device (PFD) and use an engine shut-off cord (lanyard).
2. Read and understand this User's manual and the Quick Reference Card provided with your vessel control components.
3. SeaStar and Optimus components are highly engineered and safety tested to ensure system integrity. DO NOT substitute any component. Substitution with non-SeaStar or non-Optimus components may compromise system safety, performance, and reliability.

Prior to every use

Perform a system inspection as outlined below. Refer to Section 3.3 for further details.

1. Check steering fluid level in all steering pumps.
2. Verify immediate steering response when turning steering wheel(s).
3. Inspect all steering hoses, fittings and mechanical and electrical cables for wear, kinks, or leaks.
4. Check for binding, loose, worn or leaking steering or shift/throttle control components.
5. Verify proper shift and throttle response for all control levers.
6. Verify that no alarms or warnings are shown on the CANtrak display.

⚠ WARNING

DO NOT OPERATE BOAT IF ANY COMPONENT IS NOT IN PROPER WORKING CONDITION.

1.0 Safety information (continued)

During use

1. WEAR A COAST GUARD-APPROVED PERSONAL FLOTATION DEVICE (PFD).
2. Attach engine shut-off cord (lanyard) to your pfd.
3. Never allow anyone not familiar with the operation of the vessel control system to operate the boat at ANY time.
4. Know and adhere to all applicable federal, state, and municipal laws and regulations that govern boating in your area.

⚠ WARNING

DO NOT OPERATE BOAT IF ANY COMPONENT IS NOT IN PROPER WORKING CONDITION.

After use

Rinse off the SmartCylinders thoroughly, using only fresh, clean water.

DO NOT rinse the PCM, pumps, actuators, or any other component of the Optimus system.

DO NOT use acetone, or cleaners containing ammonia, acids, or any other corrosive ingredients on any Optimus components.

Maintenance

Maintain your Optimus Steering as directed in Section 7 of this manual.

Keep our waters clean for all current and future users. Dispose of all fluids in accordance with your local regulations.

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1.1 Safety Labels

⚠ WARNING

NOTE: THE LABELS BELOW SHOULD CALL ATTENTION TO THE POSSIBLE HAZARDS ASSOCIATED WITH THE EQUIPMENT SHOWN LATER IN THIS MANUAL (SEE SECTION 3.1)

Hydraulic Pump Labels

⚠ CAUTION
HOT

OPTIMUS BY SeaStar

HYDRAULIC STEERING PUMP

PART No. EP1000
6.9 MPa (1000psi) MAX. | 12 Volt

SERIAL NO:
12-100001

⚠ WARNING

Prior to use check fluid level in pump reservoirs. Install and maintain in accordance with SEASTAR SOLUTIONS installation manuals. Use SeaStar Electronic Power Steering Fluid ONLY. NEVER use brake fluid. Any non-approved fluid may cause irreparable damage resulting in loss of steering control and may void warranty. Failure to comply with the above may result in loss of steering control, leading to possible ejection from vessel causing property damage, personal injury and/or death.

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Figure 1-1. Hydraulic steering pump labels.

Pump Control Module (PCM) Labels

CAN 1 CAN 1 CAN 3 CAN 2

EM1100 PUMP CONTROL MODULE

OPTIMUS BY SeaStar

RFU 1

⚠ WARNING
REFER TO INSTRUCTIONS FOR SPECIFIC APPLICATION. INSTALL AND MAINTAIN IN ACCORDANCE WITH SEASTAR SOLUTIONS INSTRUCTIONS. FAILURE TO COMPLY WITH ABOVE MAY RESULT IN LOSS OF STEERING CONTROL, LEADING TO POSSIBLE EJECTION FROM VESSEL CAUSING PROPERTY DAMAGE, PERSONAL INJURY AND/OR DEATH.

SERIAL NUMBER:

RFU 2

CE
ABYC Setting Standards for Safer Boating
SEASTAR SOLUTIONS
ISO 25197
Ignition Protected
SAE J1171
Patent Pending
12V

Figure 1-2. PCM labels.

SmartCylinder Label

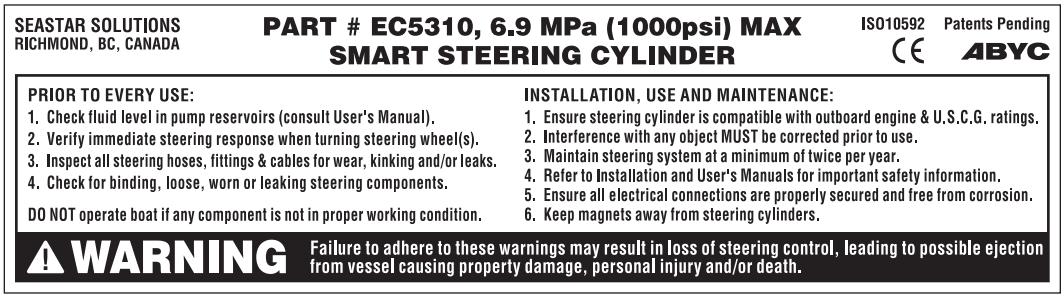
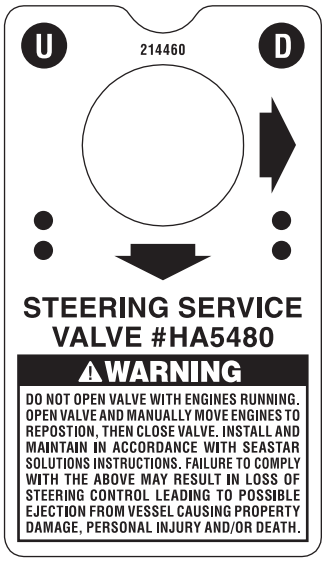

SEASTAR SOLUTIONS
RICHMOND, BC, CANADA
PART # EC5310, 6.9 MPa (1000psi) MAX
SMART STEERING CYLINDER
ISO10592
Patents Pending
ABYC
PRIOR TO EVERY USE:
1. Check fluid level in pump reservoirs (consult User's Manual).
2. Verify immediate steering response when turning steering wheel(s).
3. Inspect all steering hoses, fittings & cables for wear, kinking and/or leaks.
4. Check for binding, loose, worn or leaking steering components.
DO NOT operate boat if any component is not in proper working condition.
INSTALLATION, USE AND MAINTENANCE:
1. Ensure steering cylinder is compatible with outboard engine & U.S.C.G. ratings.
2. Interference with any object MUST be corrected prior to use.
3. Maintain steering system at a minimum of twice per year.
4. Refer to Installation and User's Manuals for important safety information.
5. Ensure all electrical connections are properly secured and free from corrosion.
6. Keep magnets away from steering cylinders.
WARNING
Failure to adhere to these warnings may result in loss of steering control, leading to possible ejection from vessel causing property damage, personal injury and/or death.

Figure 1-3. SmartCylinder labels.

Steering Service Valve Labels

To be installed close to the service valve.


U
214460
D
STEERING SERVICE
VALVE #HA5480
WARNING
DO NOT OPEN VALVE WITH ENGINES RUNNING. OPEN VALVE AND MANUALLY MOVE ENGINES TO REPOSTION, THEN CLOSE VALVE. INSTALL AND MAINTAIN IN ACCORDANCE WITH SEASTAR SOLUTIONS INSTRUCTIONS. FAILURE TO COMPLY WITH THE ABOVE MAY RESULT IN LOSS OF STEERING CONTROL LEADING TO POSSIBLE EJECTION FROM VESSEL CAUSING PROPERTY DAMAGE, PERSONAL INJURY AND/OR DEATH.

STEERING SERVICE VALVE
OPERATION:
• TURN OFF ENGINES • OPEN VALVE
• MANUALLY MOVE ENGINE(S) TO REPOSITION • CLOSE VALVE
WARNING
DO NOT OPEN VALVE WITH ENGINE(S) RUNNING
FAILURE TO COMPLY WITH THE ABOVE MAY RESULT IN LOSS OF STEERING CONTROL LEADING TO POSSIBLE EJECTION FROM VESSEL CAUSING PROPERTY DAMAGE, PERSONAL INJURY AND/OR DEATH.
214461

Figure 1-4. Steering service valve labels.

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2.0 INTRODUCTION

2.1 Welcome

Welcome to the world of electronic power steering. Please take a few minutes to familiarize yourself with the System Overview and the First Time Operation sections. An understanding of the system will assure your safety and help you get the most enjoyment from your Optimus EPS steering system.

2.2 Optimus EPS System Overview

A typical Optimus EPS system consists of an Electronic Helm located behind the steering wheel which is electrically connected to a pump control module (PCM). The PCM converts the steering wheel action to electrical signals which operate hydraulic pumps. These pumps move the smart steering cylinders (SmartCylinders) at each engine.

The SmartCylinders are equipped with position sensors that feed engine position back to the PCM. Service valves are installed between the hydraulic pumps and the SmartCylinders to allow for manual positioning of the engines should a fault occur, or for use by the technician during servicing.
A CANtrak display shows system operation and fault warnings. The CANtrak display also permits system sensitivity and configuration adjustments.

The Optimus EPS system is designed and tested to exceed ABYC safety standards, and includes many advancements to make the system as fail-safe as possible. These include redundant sensors, fault-tolerant communications, self-monitoring, and fault communications to notify and advise the operator in case of fault.

2.3 Optimus EPS Single Station System Diagram

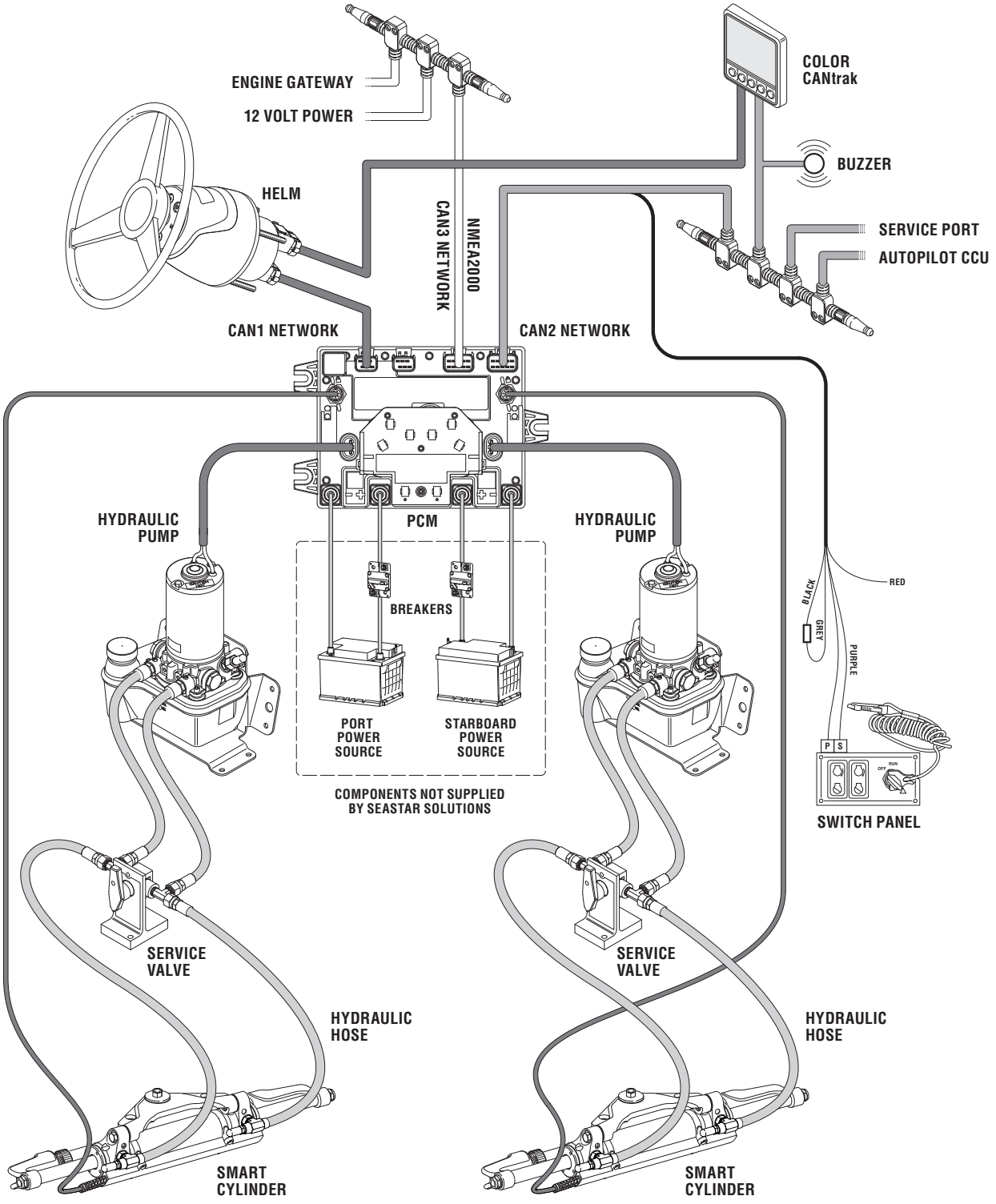

Figure 2-1. Optimus EPS system diagram, single station.

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2.4 Optimus EPS Dual Station System Diagram

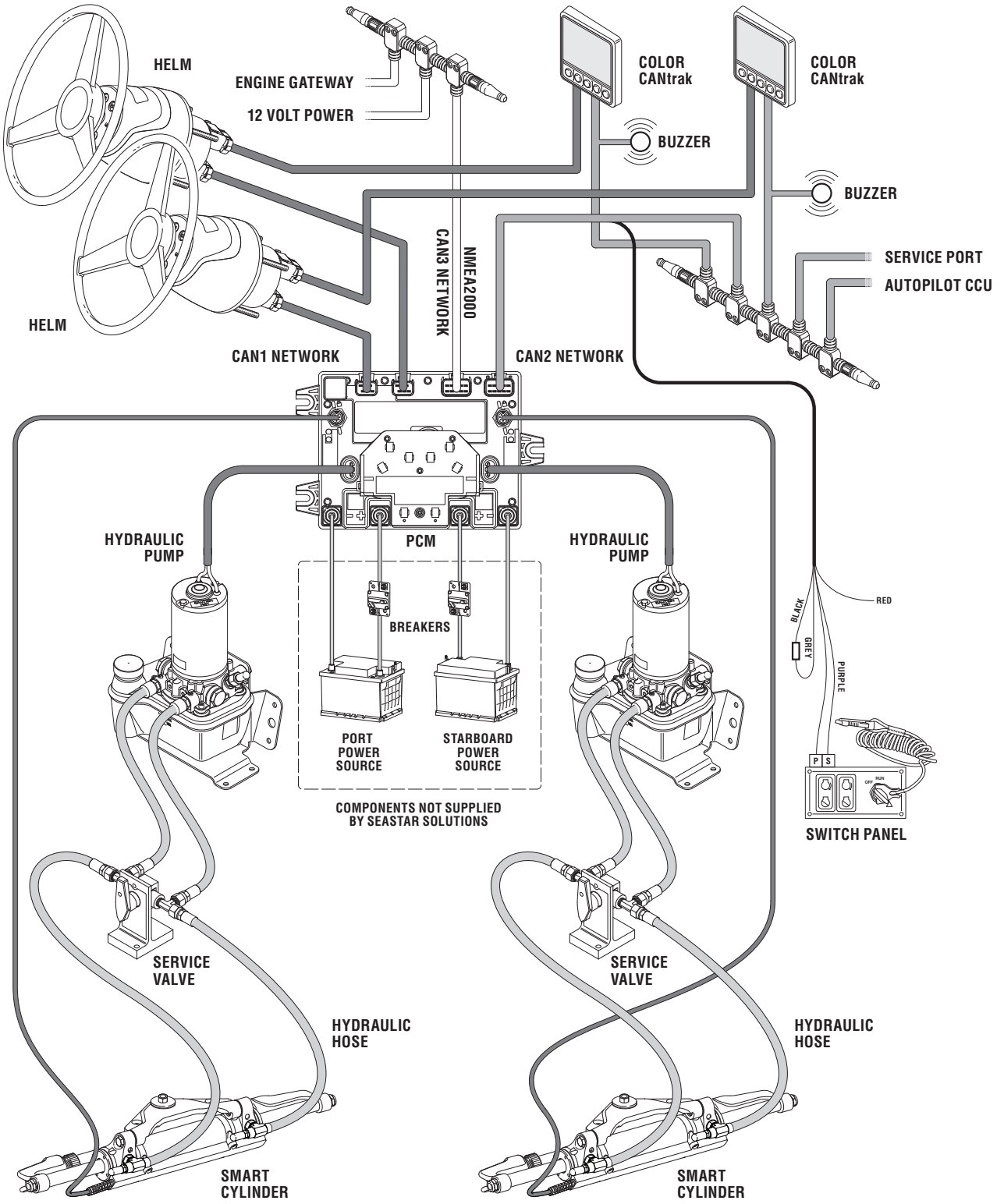

Figure 2-2. Optimus EPS system diagram, dual station.

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3.0 FIRST TIME OPERATION

3.1 Locate the Following Steering System Components

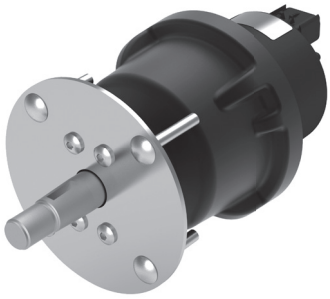
3.1.1 Electronic Helm(s)

The steering wheel is attached to this unit, which may be located immediately under the wheel or just behind the dash panel. The images below show typical helms.

⚠ CAUTION

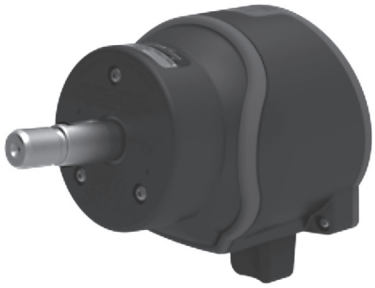
Keep magnets away from the helm. They may interfere with proper helm operation.

EPS Front Mount Helm



EPS Rear Mount Helm

EPS Classic Tilt Helm



EPS Sport Plus Tilt Helm

Figure 3-1. EPS Helm configurations.

3.1.2 Circuit Breakers for Optimus EPS System

These are supplied by the installer and may be mounted in a variety of locations. Check near the batteries, in the circuit breaker box, or near the PCM or hydraulic pumps. There should be a 60 amp breaker for each PCM power feed.

3.1.3 Pump Control Module (PCM)

The PCM is located in a dry area and can usually be found inside the center console, in the area behind the dash, or in a compartment near the engines or batteries. The PCM is always located close to the steering pumps. There will be one PCM on most boats (except for some triple and quad engine configurations that use two PCMs).

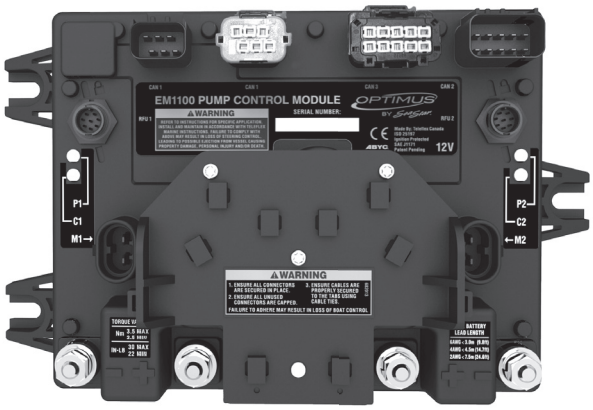


Figure 3-2. Pump control module.

3.1.4 Hydraulic Steering Pumps

The hydraulic steering pumps supply pressurized fluid to the SmartCylinders to steer the engines, and are located near the PCM. They can usually be found in a compartment near the engines, the center console, or behind the dash. There is one pump for each steering cylinder. The steering fluid reservoir is mounted directly to the pump; it is here that you will check the fluid level and add steering fluid as necessary.

Note: these pumps look similar to the trim pumps that tilt the engines. They can be distinguished by the decal and the green SeaStar EPS steering fluid.

Figure 3-3. Hydraulic pump and reservoir.

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3.1.5 SmartCylinders

On outboard boats these are always located just below the engine cowling and are attached to the engine tiller arm. There will be one SmartCylinder for each engine on twin-engine boats. Most triple- and quad-engine boats use tie-bars to steer a pair of engines with a single SmartCylinder.

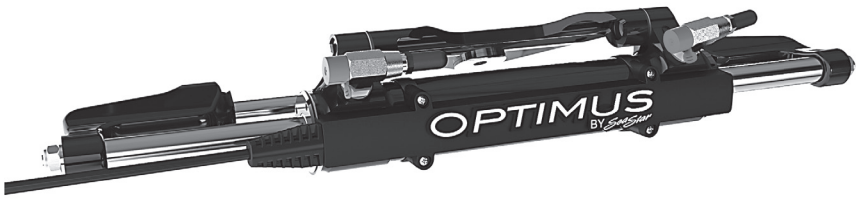

Figure 3-4. SmartCylinder with sensor.

3.1.6 Steering Service Valves

These are located in the hydraulic lines that go from the steering pumps to the SmartCylinders. There is one for each steering cylinder.

The steering service valves permit the bypass of the EPS system and allow the engines to be manually positioned. They should only be used in the event of an EPS system failure. Instructions on how to proceed will be supplied on the CANtrak display or in Section 6.2.

Figure 3-5. Steering service valve

⚠ WARNING

WEAR A COAST GUARD-APPROVED PERSONAL FLOTATION DEVICE (PFD) WHEN MANUALLY REALIGNING ENGINES.

3.1.7 CANtrak Display

There is a display at the main helm station that shows the system status and allows system adjustments. A CANtrak display may also be installed at additional helm stations.

Part No. ED1700

Figure 3-6. CANtrak Display.

The CANtrak display is supplied with a plastic cover to protect it from the weathering effects of sunlight. Remove and stow the cover before using the boat, and replace it when finished.

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3.2 Initial Start Up

Turning on the ignition switch will turn on the Optimus EPS system. The CANtrak Display will turn on and steering will become active at *all* helms.

After reading the initial warning screen press the INFO button and follow the prompts for a system inspection.

WARNING
Failure to adhere to these warnings may result in loss of boat control, ejection, property damage, personal INJURY, or DEATH. Perform system inspection. Check fluid, steering/throttle response. Inspect items for wear/leaks. Press 'INFO' for more detail on system inspection. Press 'OK' to confirm completion.
Info
Ok

Figure 3-7. CANtrak initial warning screen.

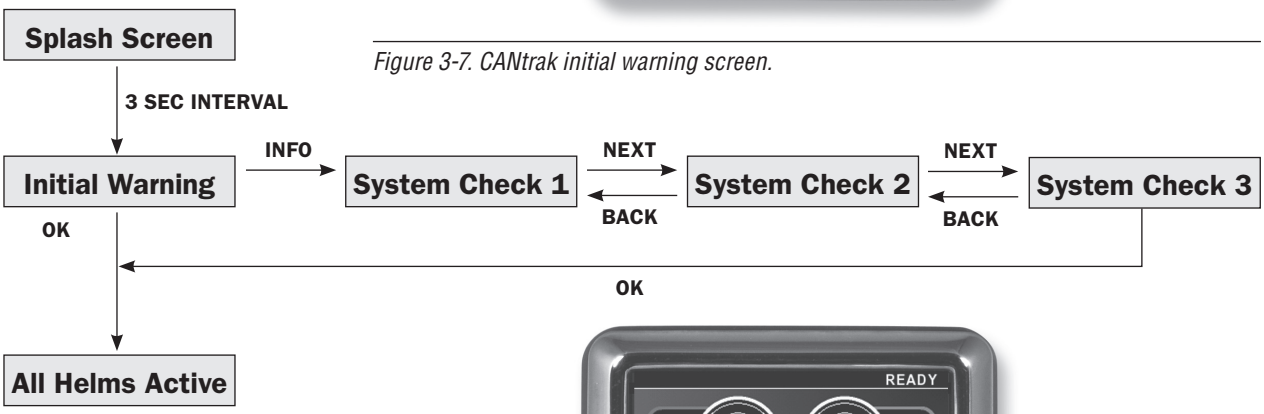

Figure 3-8. All Helms Active screen (normal steering mode).

⚠ WARNING

ON MULTIPLE HELM STATION BOATS ALL STEERING HELMS ARE ACTIVE WHEN THE OPTIMUS EPS IS TURNED ON. THIS IS THE SAME AS YOU WOULD FIND ON A CONVENTIONAL HYDRAULIC STEERING SYSTEM.

3.3 System Inspection

⚠ WARNING

FAILURE TO ADHERE TO THESE WARNINGS MAY RESULT IN LOSS OF BOAT CONTROL, LEADING TO POSSIBLE EJECTION FROM VESSEL, CAUSING PROPERTY DAMAGE, PERSONAL INJURY AND/OR DEATH.

1. Check steering fluid level in all steering pumps.

Each Optimus hydraulic pump has a steering fluid reservoir. Ensure the fluid level is between the MIN and MAX marks on the reservoir as shown in the figure below. Use only SeaStar EPS steering fluid (HA5482) in the Optimus EPS System.

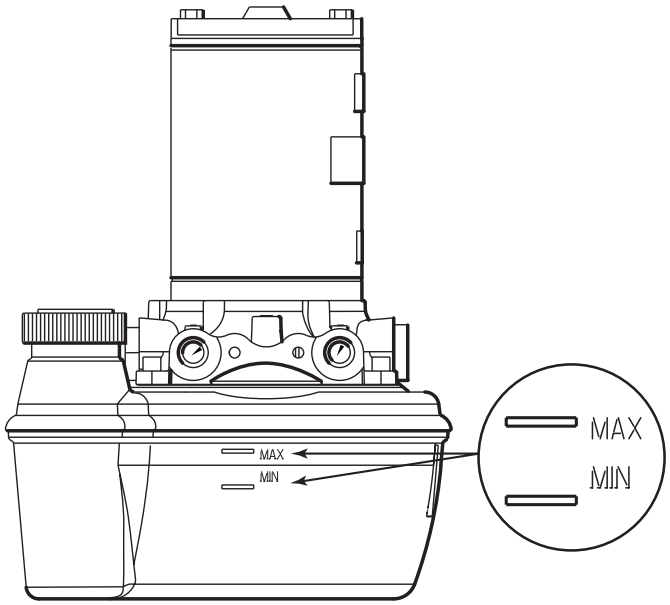

Figure 3-9. Location of fluid level marks.

2. Verify immediate steering response when turning steering wheel(s).

Turn the steering wheel slowly to port and to starboard and make sure the engines follow the commands. Watch that the hoses and cables move freely without any snags or hang-ups.

3. Inspect all steering hoses, fittings and mechanical and electrical cables for wear, kinks, or leaks.

Check all steering hoses and fittings between the pump, service valves and cylinders for any signs of leakage, kinking, wear or chafing. Check all electrical and mechanical cabling for abrasion, wear, rubbing or chafing. Check that all connections are tight and free of corrosion.

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4. **Check for binding, loose, worn or leaking steering or shift/ throttle control components.**

   Check all shift and throttle cables for signs of wear, damage or chafing. Check that all linkages and cables move freely and are not binding or corroded.

5. **Verify proper shift and throttle response for all control levers.**

   Check that all shift and throttle levers operate freely and cause the engines to shift accordingly. Put the engines in neutral idle mode and confirm that the throttle responds correctly and returns to idle.

6. **Verify that no alarms or warnings are shown on the CANtrak display.**

   If any warnings are found, follow the instructions on the CANtrak screen or refer to Section 6 before proceeding.

   Read the System Inspection steps on the CANtrak display and acknowledge them by pressing the button labeled OK.

⚠ WARNING

DO NOT OPERATE BOAT IF ANY COMPONENT IS NOT IN PROPER WORKING CONDITION.

After becoming familiar with the system inspection process, the operator can use the OK button to acknowledge that the system inspection process was understood and completed and can then go directly to the steering mode screen.

⚠ CAUTION

It is recommended the full system inspection be reviewed on a regular basis to retain familiarity.

3.4 Installation Checks

To verify correct installation of the Optimus SmartCylinder, perform the following installation checks when the boat is delivered and after each boat servicing. You will need someone to assist you.

⚠ WARNING

FAILURE TO PERFORM THESE CHECKS MAY RESULT IN DAMAGE TO THE SMARTCYLINDER SENSOR AND AFFECT THE SAFE OPERATION OF THE BOAT'S STEERING.

1. **Interference Checks –** Confirm that there is no interference between the steering cylinder(s), splashwell, outboard engine, or any combination of these parts, by performing the steps below. For each step also check that the hoses and cables are moving freely with no rubbing or binding (see figure 3-10 and figure 3-11). Be sure to steer slowly while performing these checks.
   a) With the engines fully tilted DOWN, turn the steering wheel from hard over to hard over and confirm that no interference occurs.
   b) With the engines fully tilted UP, turn the steering wheel from hard over to hard over and confirm that no interference occurs.
   c) Trim the port engine fully DOWN and the starboard engine fully UP. Turn the steering wheel from hard over to hard over and confirm that no interference occurs.
   d) Trim the starboard engine fully DOWN and the port engine fully UP. Turn the steering wheel from hard over to hard over and confirm that no interference occurs.

⚠ WARNING

IF ANY ISSUES ARE FOUND DURING THE INSTALLATION CHECKS, IMMEDIATELY RETURN THE BOAT TO THE SERVICE DEALER FOR THOSE ISSUES TO BE REMEDIED.

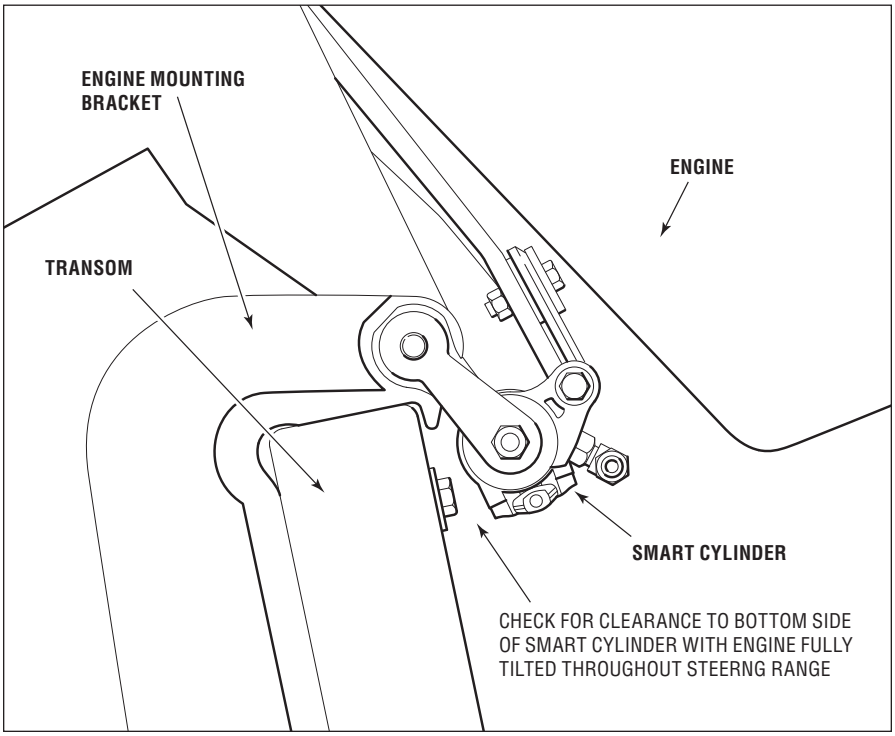
ENGINE MOUNTING BRACKET
ENGINE
TRANSOM
SMART CYLINDER
CHECK FOR CLEARANCE TO BOTTOM SIDE OF SMART CYLINDER WITH ENGINE FULLY TILTED THROUGHOUT STEERNG RANGE

Figure 3-10. Engine side view when tilted.

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2. Sensor cable – Confirm that the SmartCylinder Sensor Cable is tied securely to the hoses with gradual bends as shown figure 3-11.

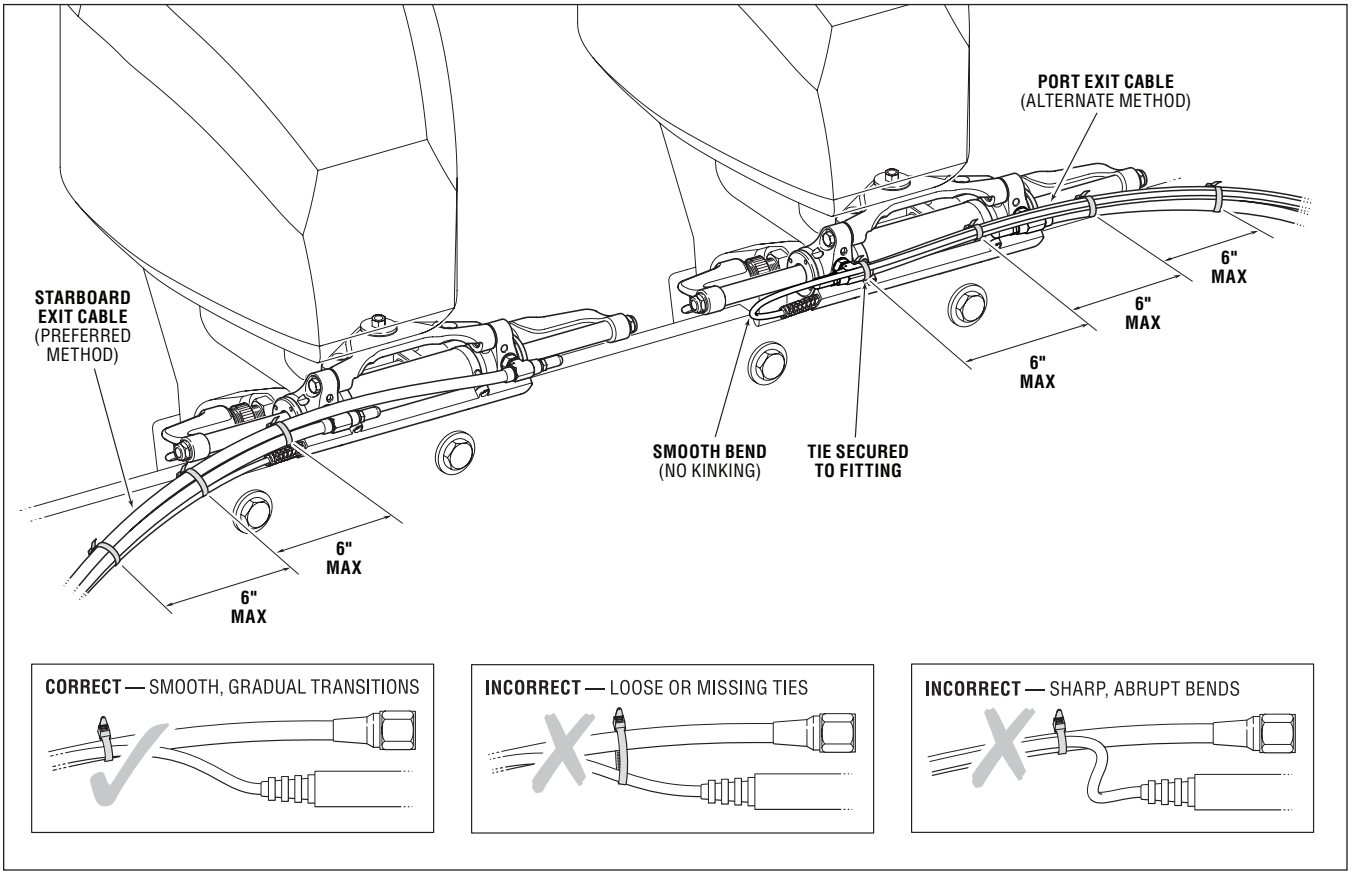

Figure 3-11. Sensor cable and hose routing checks.

3.5 Initial Sea Trial

With the engine lanyard properly connected to you, and any passengers securely seated, carefully proceed to a section of deep, open water at a slow to moderate speed. Use the trip to get a feel for the steering response. When in open water that is deep enough to assure you will not run aground, try various maneuvers with the boat at various speeds until you are comfortable operating the boat. Be sure to spend some time backing up at a slow speed. Once familiar with the operation run the boat in a safe, normal fashion and enjoy your electronic power steering.

If adjustments to the system are required, see Section 5.0 for steering adjustments or contact your dealer.

⚠ CAUTION

Keep magnets away from the helm. They may interfere with proper helm operation.

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4.0 SYSTEM USE

If this is the first-time use, or for more details, see Section 3 of this manual.

4.1 Before Each Use

⚠ WARNING

PRIOR TO EVERY USE:

PERFORM A SYSTEM INSPECTION AS OUTLINED BELOW, SEE SECTION 8.3 FOR FURTHER DETAILS.

1. Remove steering lock clips (see Appendix B) if they have been installed for trailering or storage.
2. Check steering fluid level in all steering pumps.
3. Verify immediate steering response when turning steering wheel(s).
4. Inspect all steering hoses, fittings and mechanical and electrical cables for wear, kinks, or leaks.
5. Check for binding, loose, worn or leaking steering or shift/throttle control components.
6. Verify proper shift and throttle response for all control levers.
7. Verify that no alarms or warnings are shown on the CANtrak display.

⚠ WARNING

DO NOT OPERATE BOAT IF ANY COMPONENT IS NOT IN PROPER WORKING CONDITION.

4.2 Multiple Station Boats

⚠ DANGER

NEVER ATTEMPT TO MOVE FROM ONE HELM STATION TO ANOTHER WHILE THE VESSEL IS UNDER WAY. ALWAYS PLACE ENGINES IN NEUTRAL AND ENSURE THE BOAT IS STATIONARY BEFORE MOVING TO ANOTHER STATION.

⚠ CAUTION

On multiple helm station boats all helms are active when the Optimus EPS is turned on.

The Optimus EPS system is designed to operate much like a conventional hydraulic steering system. The boat can be steered from any helm without requiring additional steps to transfer control.

Like a conventional hydraulic system, steering input from each helm is added cumulatively, which means it is possible that steering inputs from a second helm can cancel out or exaggerate the operator's inputs. It is important that all passengers, and especially children, are instructed not to touch the helms unless specifically requested to take control.

4.3 Autopilot Operation

⚠ WARNING

ALWAYS READ AND UNDERSTAND THE AUTOPILOT OPERATION INSTRUCTIONS COMPLETELY BEFORE ENGAGING THE AUTOPILOT MODE.

The Optimus EPS steering system is designed to interface with many autopilot controllers. See your Autopilot's documentation for specific model compatibility.

On boats with an autopilot the steering effort may be noticeably higher when the autopilot is engaged. This resistance is user adjustable, see Section 5.4.3 of this manual.

When any wheel is turned with the autopilot engaged, the helm will take control of the system and manually override the autopilot. When this happens, the steering resistance will return to normal until the autopilot re-engages. See your autopilot user's manuals for specific system behavior.

⚠ WARNING

NEVER LEAVE THE HELM STATION UNATTENDED WHEN THE AUTOPILOT IS ENGAGED.

The Title Bar will display "Autopilot Mode" when the autopilot is engaged.

Figure 4-1. Autopilot mode screen.

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5.0 CANtrak DISPLAY

5.1 Purpose

The Optimus CANtrak display has an easy to navigate menu system, adjustable backlighting for night use and includes a cover to protect it from the sun when not in use.

Figure 5-1. CANtrak display, All Helms Active screen.

The CANtrak display serves these purposes:

1. Displays the current system operating conditions.

2. Handles system faults:

a) Displays system warnings in case of a system fault.

b) Sounds an audible alarm in case of a system fault.

c) Instructs the operator what to do in case of a system fault.

3. Permits changes to the basic system settings.

4. Provides system and diagnostic information

For details on CANtrak operation see sections 5.2 through 5.4 of this manual.

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5.2 CANtrak Display Navigation

The five buttons at the bottom of the unit are used to select various actions. The five boxes at the bottom of the display screen indicate the legend for each button. These legends vary based on what is on the screen.

WORD OR SYMBOL	IDENTIFIES A FUNCTION OR SETTING
^	Moves the cursor up the screen to the next item.
v	Moves the cursor down the screen to the next item.
>	Enters the sub-menu at the cursor location.
–	Reduces the setting of the selected item.
+	Increases the setting of the selected item.
OK	Accepts a given statement or condition and advances to the next screen.
↺	Returns to previous menu.
Save	Saves change and returns to previous menu.

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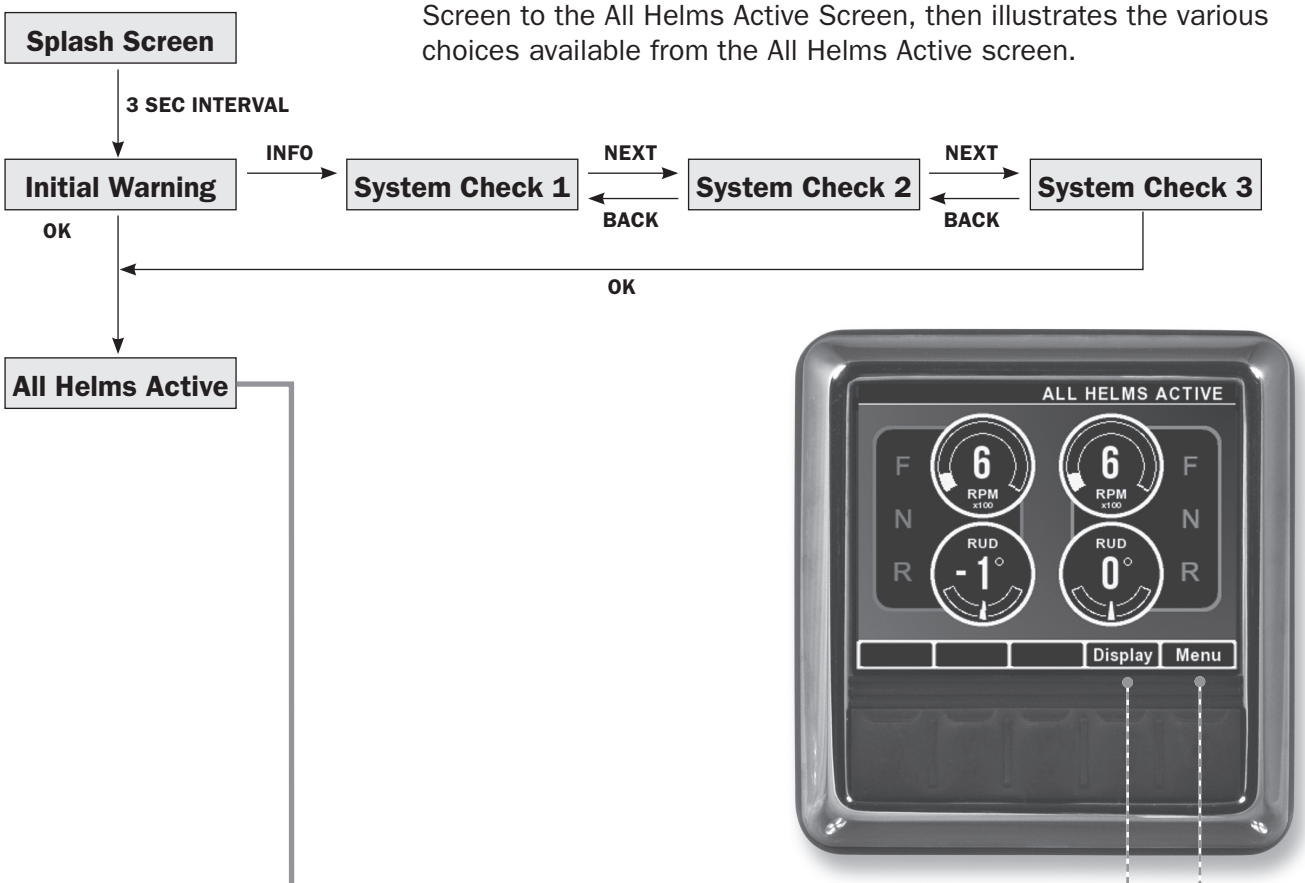
5.3 CANtrak Display Map – All Helms Active (Normal Steering Mode)

The following diagram shows the progression from the Splash Screen to the All Helms Active Screen, then illustrates the various choices available from the All Helms Active screen.



DISPLAY

Adjust display brightness

MENU

Settings* – Set steering parameters such as number of turns and steering effort.

Faults – View active faults.

System Health – View the status of all devices on the network.
✔ Good ⚠ Warning, but operational ✖ Failed ? Not found

Device List – Access product information, such as part number and serial number, for each device on the network.

** Menu may be deactivated. Contact your dealer.*

Figure 5-2. CANtrak display map.

5.4 All Helms Active Screens

5.4.1 **All Helms Active** (Normal Steering Mode)

The All Helms Active mode screen (may also be referred to as the Run screen) will be displayed under normal operating conditions after the startup warning has been acknowledged.

The All Helms Active screen displays the current system operating conditions. It shows the engine RPM as well as the rudder angle. It also allows access to the Display & Menu screens.

Figure 5-3. All Helms Active screen.

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5.4.3 Settings Screen [Steering]*

If your dealer has provided you with this menu option then the Adjust screen allows adjustment of system parameters which affect steering operation and feel. Specific details of each parameter are listed below.

Changes made in the Adjust screen are saved to memory upon exiting the Adjust screen. You will be prompted to save changes before exiting as shown in the display.

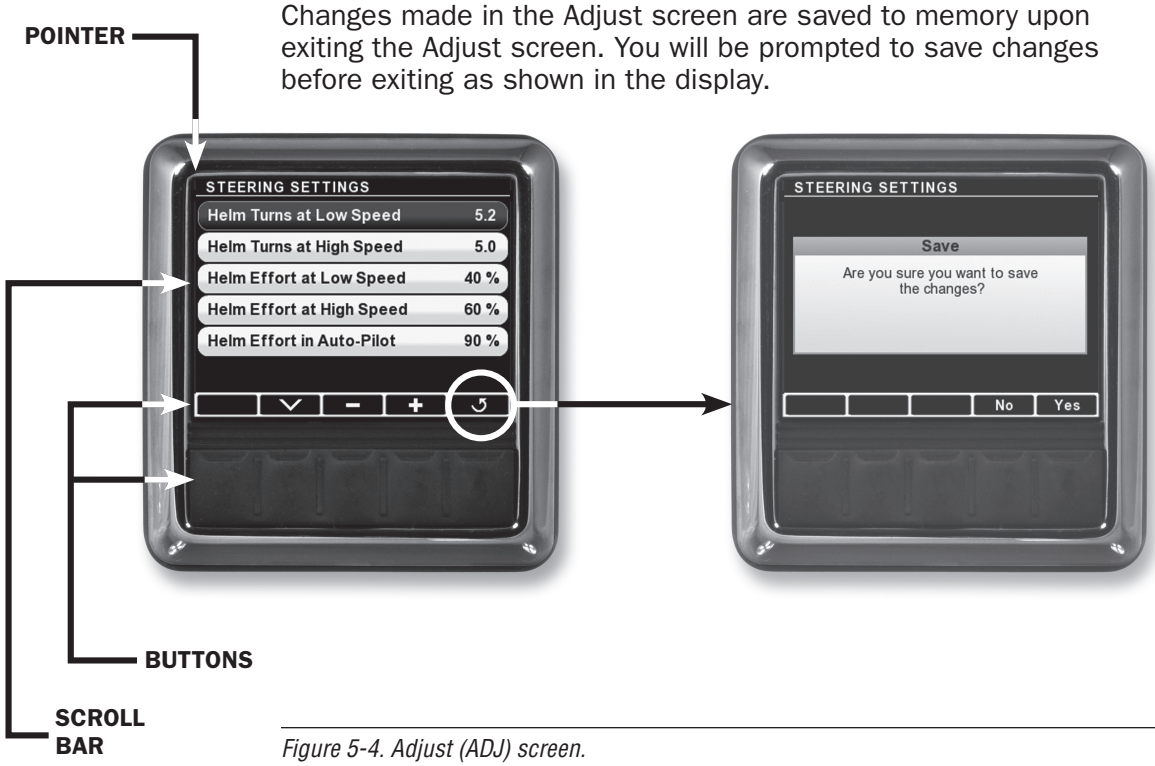

Figure 5-4. Adjust (ADJ) screen.

Helm Turns at Low Speed

Sets the number of turns (hard-over to hard-over) when the vessel is running at low speeds. The range is 3.5 to 8 Turns.

Helm Turns at High Speed

Sets the number of turns (hard-over to hard-over) when the vessel is running at high speeds. The range is 3.5 to 8 Turns.

Helm Effort at Low Speed

Sets the steering resistance when the vessel is running at low speeds. It is adjustable between 1 and 100.

Helm Effort at High Speed

Sets the steering resistance when the vessel is running at high speeds. It is adjustable between 1 and 100.

Helm Effort in Auto-Pilot

Sets the steering resistance when autopilot is engaged. To prevent accidental course corrections with the wheel this should be set slightly higher than the high speed effort. It is adjustable between 1 and 100.

** May not be available on all installations. Contact your dealer/builder.*

5.4.3 Settings Screen [Steering]* continued

The steering resistance and turns have both low speed and high speed settings. The low speed and high speed set points may be determined by various sources, for example: Engine RPM, Throttle position, etc. These are configured by your dealer and are not adjustable.

The number of turns and steering resistance at these low and high speeds are user adjustable*. These settings will automatically increase smoothly between the low speed and high speed points as shown in figure 5-5.

⚠ CAUTION

Adjusting steering effort for steering turns can significantly impact boat handling. Proceed with caution after making any changes.

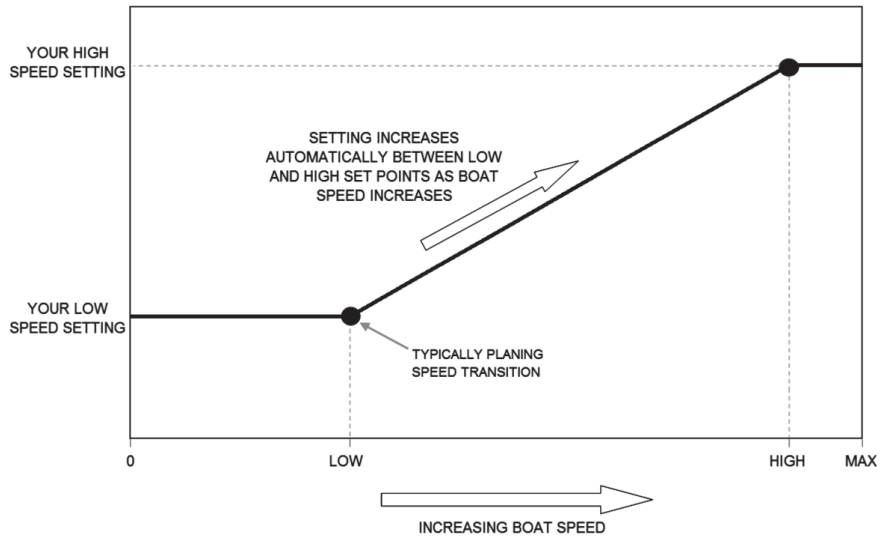

Figure 5-5. Change of helm settings with speed.

** May not be available on all installations. Contact your dealer.*

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5.4.4 Display (DISP) Screen

The Display screen allows adjustment of the brightness of the CANtrak display. These should be adjusted to provide good daytime and night time visibility of the display.

Figure 5-6. Display adjustment screen.

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6.0 SYSTEM FAULTS & HAZARDS

Should a steering fault occur it will be communicated to the user though the CANtrak display. This section defines the three types of hazards you may experience and how the system will handle each.

NOTICE

When a serious fault occurs, consider your options. While the system has many features to allow the boat to return to port in a slow and safe manner, local conditions or operator skills may dictate that calling for assistance is the prudent thing to do.

6.1 Hazard Definitions

6.1.1 Danger

A danger fault is a critical system fault which will result in limited or no steering performance and requires immediate action.

Depending on the nature of the fault, steering will either be restricted to one engine or suspended completely. The engines may need to be manually realigned and the vessel steered using the shift and throttle.

In the event of a danger fault, the CANtrak buzzer will sound continuously (until muted) and the CANtrak display will advise the operator on how to proceed. See Section 6.2.1 for danger fault handling specifics.

6.1.2 Warning

A warning fault is a non-critical system fault which may cause the steering speed to be reduced.

Although a warning fault may not always adversely affect steering performance it is an indication of a problem in the system and should be remedied.

In the event of a warning fault, the CANtrak buzzer will sound intermittently (until muted) and the CANtrak will display the Warning screen. See Section 6.2.3 for warning fault handling specifics.

6.1.3 Caution

A caution fault is a non-critical system fault that will have no effect on system performance. Although a caution fault will not adversely affect steering it is an indication of a problem in the system and should be corrected as soon as possible. The yellow warning triangle will remain on the CANtrak display screen until a technician has remedied the issue.

6.2 System Fault Handling

In case of a Danger or Warning message, the CANtrak display will advise the operator how to proceed. The following sections describe what to expect in case of either fault.

6.2.1 Danger Fault Handling

A danger fault is a critical system fault which will result in limited or no steering performance and requires immediate action.

During a danger fault, the CANtrak display will display DANGER across the top, sound a continuous buzzer (until muted) and display fault information and handling in three zones. See figure 6-1.

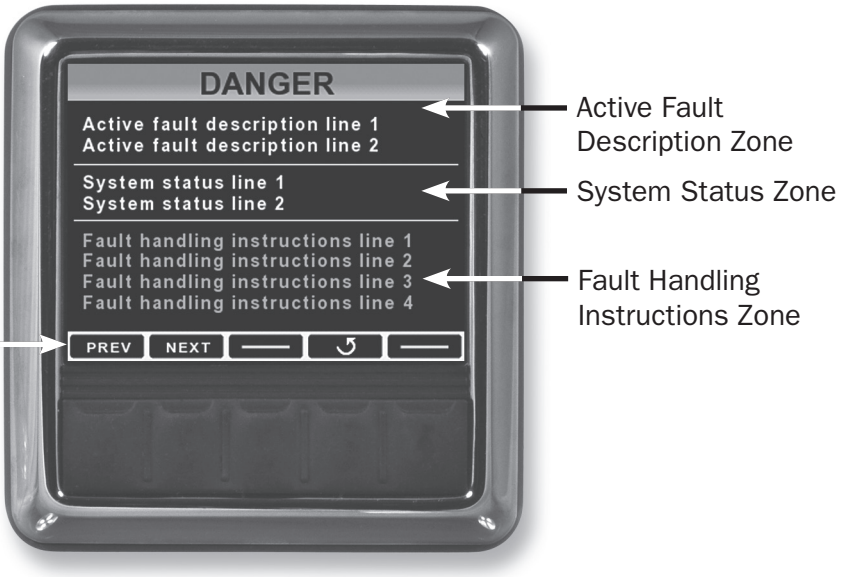
DANGER
Active fault description line 1
Active fault description line 2
System status line 1
System status line 2
Fault handling instructions line 1
Fault handling instructions line 2
Fault handling instructions line 3
Fault handling instructions line 4
PREV
NEXT
Active Fault Description Zone
System Status Zone
Fault Handling Instructions Zone
Will appear if multiple faults are active to allow user to scroll through

Figure 6-1. Danger fault screen layout.

Active Fault Description Zone

Provides details specific to the system fault. These will include a brief description of the fault and are primarily for troubleshooting purposes.

System Status Zone

Displays information about the status of the system and if the system has automatically reacted to the fault.

Fault Handling Instructions Zone

Provides detailed instructions on how to proceed. In the case of a danger fault, this will instruct the operator what to do and how to proceed should Limp Home mode be required.

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6.2.2 Limp Home

When a Danger fault results in steering performance being restricted or suspended, the CANtrak may provide instructions on how to enter Limp Home mode.

Limp Home will provide instructions for the user to manually move the engine(s) and allow the user to “limp home” at a reduced performance.

There are two Limp Home modes depending on the nature of the fault.

⚠ WARNING

LIMP HOME MODE IS AN OVERRIDE SYSTEM. IT MAY SEVERELY LIMIT YOUR BOAT CONTROL. IT SHOULD ONLY BE USED IN AN EMERGENCY IF YOU ARE UNABLE TO CALL FOR ASSISTANCE. PROCEED WITH EXTREME CAUTION. ALWAYS WEAR PDFS AND LANYARD. REFER TO THE NOTICE IN SECTION 6.0.

Limp Home Mode 1

This mode occurs when the system can no longer provide steering to ANY of the engines. The CANtrak will instruct the operator to manually center the engines using the service valves, then proceed to port immediately using the shift and throttle controls to steer the vessel.

LIMP HOME
Steering is Disabled.
1. Put both engines in Neutral.
2. Open Steering Service Valves.
3. Manually center all engines.
4. Close Steering Service Valves.
5. Return to port using throttles
to steer.

Figure 6-2. Limp home instructions, all steering disabled.

Limp Home Mode 2

This mode occurs when the system can no longer provide steering to ONE of the engines. The CANtrak will instruct the operator to realign the non-responsive engine, tilt it out of the water and proceed to port immediately using the responsive engine.

LIMP HOME MODE
Affected Engine Steering is Disabled.
1. Always wear PFD devices.
2. Put engines in neutral.
3. Open steering service valves.
4. Turn affected engine fully away from other
5. Close steering service valves.
6. Fully tilt affected engine.
7. Return to port.

Figure 6-3. Limp home instructions, no steering on one engine.

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6.2.3 Warning Fault Handling

A warning fault is a non-critical system fault which may cause the steering speed to be reduced.

During a warning fault, the CANtrak will display the same information as with a danger fault but WARNING will appear across the top of the screen and the buzzer will sound intermittently (until muted).

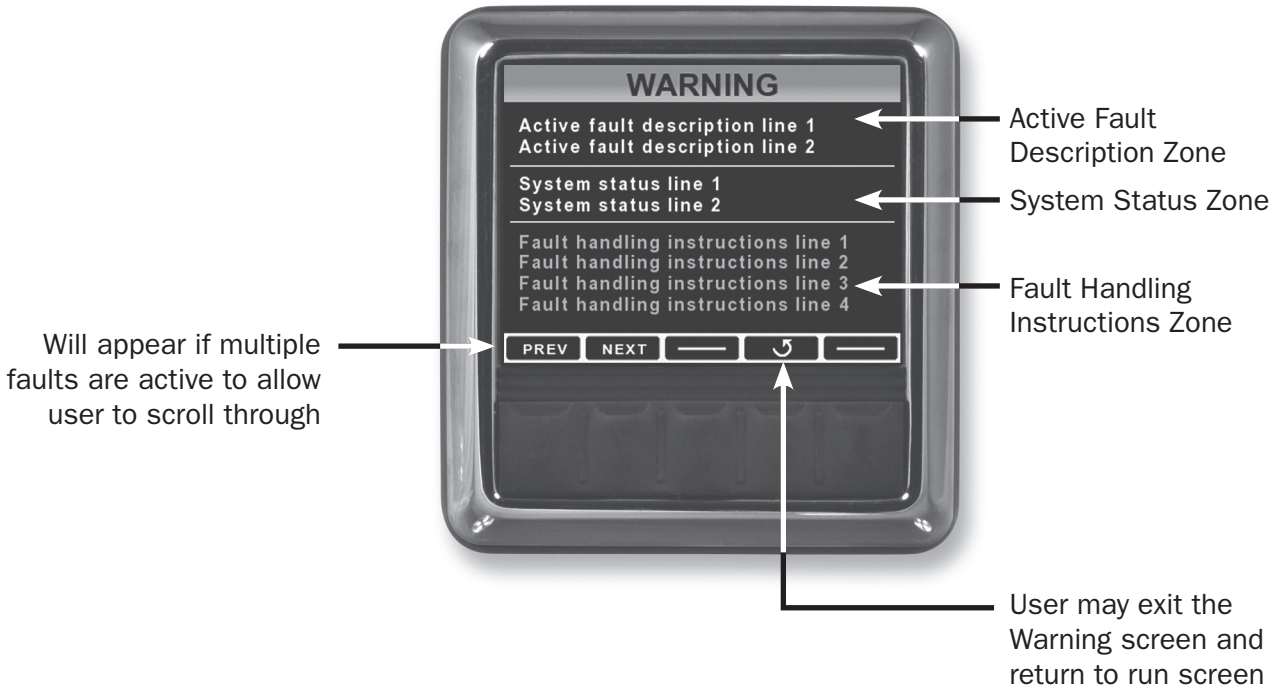
WARNING
Active fault description line 1
Active fault description line 2
System status line 1
System status line 2
Fault handling instructions line 1
Fault handling instructions line 2
Fault handling instructions line 3
Fault handling instructions line 4
PREV
NEXT
Active Fault Description Zone
System Status Zone
Fault Handling Instructions Zone
Will appear if multiple faults are active to allow user to scroll through
User may exit the Warning screen and return to run screen

Figure 6-4. Warning fault screen layout.

The user may choose to exit the Warning screen and return to the All Helms Active screen by pressing the exit button, in which case the system will flash a warning icon on the screen as shown in figure 6-5. This icon will remain in place until the fault is repaired. If the system recovers from the fault (e.g. if a battery runs low and is subsequently charged) the warning screen will disappear and the system will automatically resume normal operation.

In rare cases there may be multiple Warning faults at the same time. You can view a list of all active warning faults by selecting “Active Warnings” from the Diagnostics (DIAG) screen.

6.2.3 Warning Fault Handling continued

Although the system may still operate normally under many warning faults, the vessel should still be returned to port and serviced immediately.

Figure 6-5. Run screen with system warning.

Some system faults may result in a reduced steering response warning. This means that the system will continue to steer normally but may respond more slowly.

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6.2.4 System Fault Handling – Example

The following is an example of how the system would respond to the warning fault hazard of a communication loss.

The CANtrak display will enter the warning screen mode and pulse the system warning buzzer. The three warning screen zones will appear as shown below.

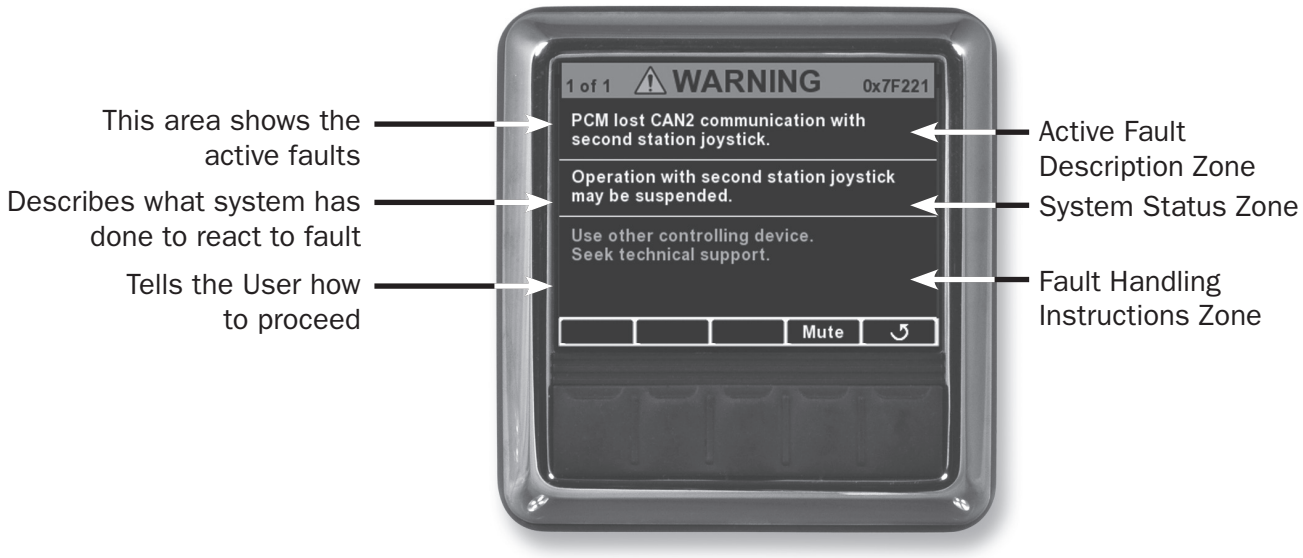
This area shows the active faults
Describes what system has done to react to fault
Tells the User how to proceed
1 of 1
WARNING
0x7F221
PCM lost CAN2 communication with second station joystick.
Operation with second station joystick may be suspended.
Use other controlling device.
Seek technical support.
Mute
Active Fault Description Zone
System Status Zone
Fault Handling Instructions Zone

Figure 6-6. Sample warning fault.

6.2.5 CANtrak Loss of Display

If CANtrak display operation is lost proceed as follows:

1. On a multiple helm station vessel each station may be equipped with a CANtrak display. If so equipped, navigate from another helm station and return to port for service.
2. If there are no secondary displays on board, carefully verify (at low speed) that the steering system operates normally then immediately and cautiously proceed to port for service.
3. If both steering response and CANtrak display are lost, you are unable to obtain assistance, and you are in an emergency situation, proceed as follows:

⚠ WARNING

LIMP HOME MODE IS AN OVERRIDE SYSTEM. IT MAY SEVERELY LIMIT YOUR BOAT CONTROL. IT SHOULD ONLY BE USED IN AN EMERGENCY IF YOU ARE UNABLE TO CALL FOR ASSISTANCE. PROCEED WITH EXTREME CAUTION. ALWAYS WEAR A PERSONAL FLOTATION DEVICE (PFD) AND LANYARD.

Limp Home Mode 1

If the steering system can no longer provide steering to **ANY** of the engines, proceed by using Limp Home Mode 1, as follows:

1. Put engine(s) in Neutral.
2. Open Steering Service Valves.
3. Manually center all engines.
4. Close Steering Service Valves
5. Return to port using throttles to steer.

Limp Home Mode 2

If the steering system can no longer provide steering to **ONE** of the engines, proceed by using Limp Home Mode 2, as follows:

1. Put engine(s) in Neutral.
2. Open Steering Service Valves.
3. Turn affected engine fully away from other.
4. Close Steering Service Valves
5. Fully tilt affected engine and switch it off.
6. Return to port.

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6.3 Buzzer

The buzzer is used to indicate a system fault. There are two different signals:

1. Continuously on. This indicates a danger fault. A danger fault is a critical system fault which will result in limited or no steering performance and requires immediate action. See Section 6.1.1.
2. Alternating on and off. This indicates a warning fault. A warning fault is a non-critical system fault which may cause the steering speed to be reduced. See Section 6.1.2.

All signals require immediate attention.

When the buzzer sounds a screen will appear on the CANtrak indicating the cause for the alarm. The screen will also display a “mute” button which may be used to silence the alarm.

6.4 Reduced Performance

Under certain fault conditions the steering response will slow down. A typical cause might be a very low battery. When this happens the CANtrak will advise the operator of the condition, indicate the reason, and supply instructions.

⚠ WARNING

PROCEED WITH CAUTION UNTIL THE FAULT IS CORRECTED AND NORMAL STEERING OPERATION RETURNS.

6.5 Steering Fluid Loss

In an emergency condition, and if SeaStar EPS steering fluid is not available, the following fluids may be used for a short period of time:

- SeaStar steering fluid
- Automatic transmission fluid
- Motor oil

If any of the above are used then the system should be flushed and refilled with SeaStar EPS steering fluid when the boat is returned to port.

In the event of an extreme emergency, any non-toxic, non-flammable fluid may provide temporary steering.

⚠ WARNING

NEVER USE BRAKE FLUID IN THE STEERING SYSTEM.

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7.0 MAINTENANCE

⚠ WARNING

FOLLOWING THE ROUTINE MAINTENANCE SCHEDULES OUTLINED BELOW WILL ENSURE YEARS OF SERVICE FROM YOUR OPTIMUS ELECTRONIC STEERING SYSTEM, AS WELL AS KEEP YOU AND YOUR PASSENGERS SAFE FROM THE DANGERS THAT ARE PRESENT ON AND OFF THE WATER.

7.1 Owner(s) (End Users)

Prior to every use (see Section 3.3 for further details):

1. Check steering fluid level in all steering pumps.

2. Verify immediate steering response when turning steering wheel(s).

3. Inspect all steering hoses, fittings and mechanical and electrical cables for wear, kinks, or leaks.

4. Check for binding, loose, worn or leaking steering or shift/throttle control components.

5. Verify proper shift and throttle response at all control levers.

6. Verify that no alarms or warnings are shown on the CANtrak display.

⚠ WARNING

DO NOT OPERATE BOAT IF ANY COMPONENT IS NOT IN PROPER WORKING CONDITION.

After every use:

1. Rinse the SmartCylinders with clean, fresh water and replace the CANtrak sun cover.

DO NOT rinse the PCM or the pumps.

7.2 Qualified Marine Mechanic

After the first 20 hours, then every 100 hours or 6 months thereafter (whichever comes first).

1. All points noted above.

2. Check tightness of ALL fasteners/fittings throughout the steering system. Tighten to correct torque specifications as required.

3. Check for mechanical play or slop throughout steering system, correct as required.

4. Check for signs of corrosion. If corrosion is present contact your dealer or SeaStar Solutions.

5. Check all electrical cables for chafing and wear.

After the first 200 hours or 12 months thereafter (whichever comes first).

1. All points noted above.
2. Remove support rod from engine steering/tilt tube. Clean engine steering/tilt tube and re-grease using a good quality marine grease.
3. Grease support rod liberally.
4. Grease all contact points shown in the figure below. DO NOT remover the tiller bolt to re-grease.
5. Remove the steering wheel(s) and re-grease the wheel shaft(s) using a good quality marine grease.
6. Inspect hydraulic oil for cleanliness; flush if required.
7. Check that the service valve is free to move and in the closed position.

⚠ WARNING

ANY WORK BEING PERFORMED WITH THE STEERING SYSTEM MUST BE COMPLETED BY A QUALIFIED MECHANIC WITH A WORKING KNOWLEDGE OF THE SYSTEM.

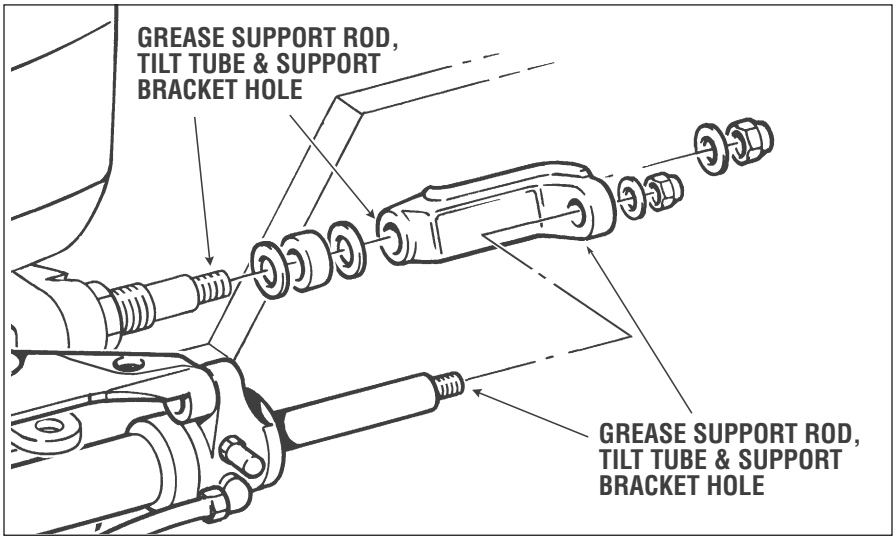

Figure 7-1. Grease points on cylinder mounts.

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8.0 TROUBLESHOOTING GUIDE

⚠ WARNING

WHENEVER, IN THE FOLLOWING TEXT, A SOLUTION CALLS FOR REMOVAL FROM VESSEL AND/OR DISMANTLING OF STEERING SYSTEM COMPONENTS, SUCH WORK MUST ONLY BE CARRIED OUT BY A QUALIFIED MARINE HYDRAULIC MECHANIC. SEASTAR SOLUTIONS OFFERS THE FOLLOWING AS A GUIDE ONLY AND IS NOT RESPONSIBLE FOR ANY CONSEQUENCES RESULTING FROM INCORRECT DISMANTLING REPAIRS.

Optimus EPS steering will provide years of safe reliable performance with a minimum of service if properly installed.

Optimus steering systems have been designed with protection against over-pressure situations, with the inclusion of a pressure relief valve and circuit breakers, to minimize the possibility of total loss of steering.

Most faults occur when the installation instructions are not followed and usually show up immediately upon filling the system. Listed below are the most common faults encountered and their likely cause and solution.

FAULT	CAUSE	SOLUTION
1. CANtrak does not turn ON?	Batteries not turned ON, or in poor working condition.	Load test batteries.
	Ignition wires disconnected.	Confirm all connections are in place.
	CANtrak connection damaged and/ or not connected.	Inspect wires for damage.
2. High/Low Speed wheel turn setting not working	Tachometer is not relaying information.	Confirm Tachometer is operating properly (check connections).
	CANtrak NOT writing proper information.	Confirm that your settings have been saved. If they are not saved, contact Tech support.
3. One engine does not steer, but CANtrak display is on.	Check circuit breaker for the engine.	Reset breaker. If it immediately trips a second time look for a shorted or pinched wire or failed component.

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9.0 REPLACEMENT PARTS

9.1 SeaStar Electronic Power Steering Fluid

The Optimus Steering System is designed for use with genuine SeaStar Electronic Power Steering Fluid.

Quart HA5482

For a comprehensive listing of part numbers, please refer to the Optimus 50 Installation Manual, part no. 682100.

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10.0 WARRANTY

10.1 Statement of Limited Warranty

We warrant to the original retail purchaser that **Marine Canada Acquisition Inc. DBA SEASTAR SOLUTIONS** (herein forward referred to as **SeaStar Solutions**) products have been manufactured free from defects in materials and workmanship. This warranty is effective for two years from date of purchase, excepting that where **SeaStar Solutions** products are used commercially or in any rental or income producing activity, then this warranty is limited to one year from the date of purchase.

We will provide replacement product without charge, for any **SeaStar Solutions** product meeting this warranty, which is returned (freight prepaid) within the warranty period to the dealer from whom such product were purchased, or to us at the appropriate address. In such a case **SeaStar Solutions** products found to be defective and covered by this warranty, will be replaced at **SeaStar Solutions'** option, and returned to the customer.

The above quoted statement is an extract from the complete **SeaStar Solutions** products warranty statement. A complete warranty policy is available in our **SeaStar Solutions** products catalogue.

10.2 Return Goods Procedure

Prior to returning product to **SeaStar Solutions** under warranty, please obtain a *Return Goods Authorization number* (claim number).

Be sure to label the goods with:
a) the name and address of the sender, and
b) the return goods authorization number (claim number)

Please address the returned goods as follows:

From U.S.A.
RGA # ?
SeaStar Solutions
c/o UPS–Supply Chain Solutions Inc.
Door A37
1201 C Street NW, Auburn, WA,
98001

From Canada
RGA # ?
SeaStar Solutions
3831 No. 6 Road
Richmond, B.C.
Canada V6V 1P6

Technical Support

Phone: 604-248-3858
email: seastar@seastarsolutions.com
Hours: Monday to Friday 05:00 – 15:30 PST
Web: www.seastarsolutions.com

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APPENDIX A – SPECIFICATIONS

OPTIMUS EPS SYSTEM SPECIFICATIONS
(Based on EPSK1200 Twin Engine Core Pack)

Operating Voltage: 12 VDC
Maximum System Pressure: 1200 PSI
# of wheel turns: Variable from 3.5 to 8
Typical Average Current Draw: ~6 to 8 Amps
Oil Type: SeaStar Electronic Power Steering Fluid

APPENDIX B – TRAILERING AND STORAGE

When trailering or storing a boat equipped with an Optimus EPS system, install the steering lock clips to all steering cylinders as shown below. These clips keep the engines from drifting, preventing contact with other components which may result in scuffing or cowling damage. Simply center the engines and snap the clips over the cylinder shafts to install.

⚠ WARNING

ENSURE STEERING LOCK CLIPS ARE REMOVED BEFORE OPERATING BOAT. FAILURE TO REMOVE STEERING LOCK CLIPS WILL RESULT IN NO STEERING CONTROL.

Alternatively, or if the clips are not available, steer the engines all the way to one side after tilting them up. The weight of the engines will keep them from shifting.

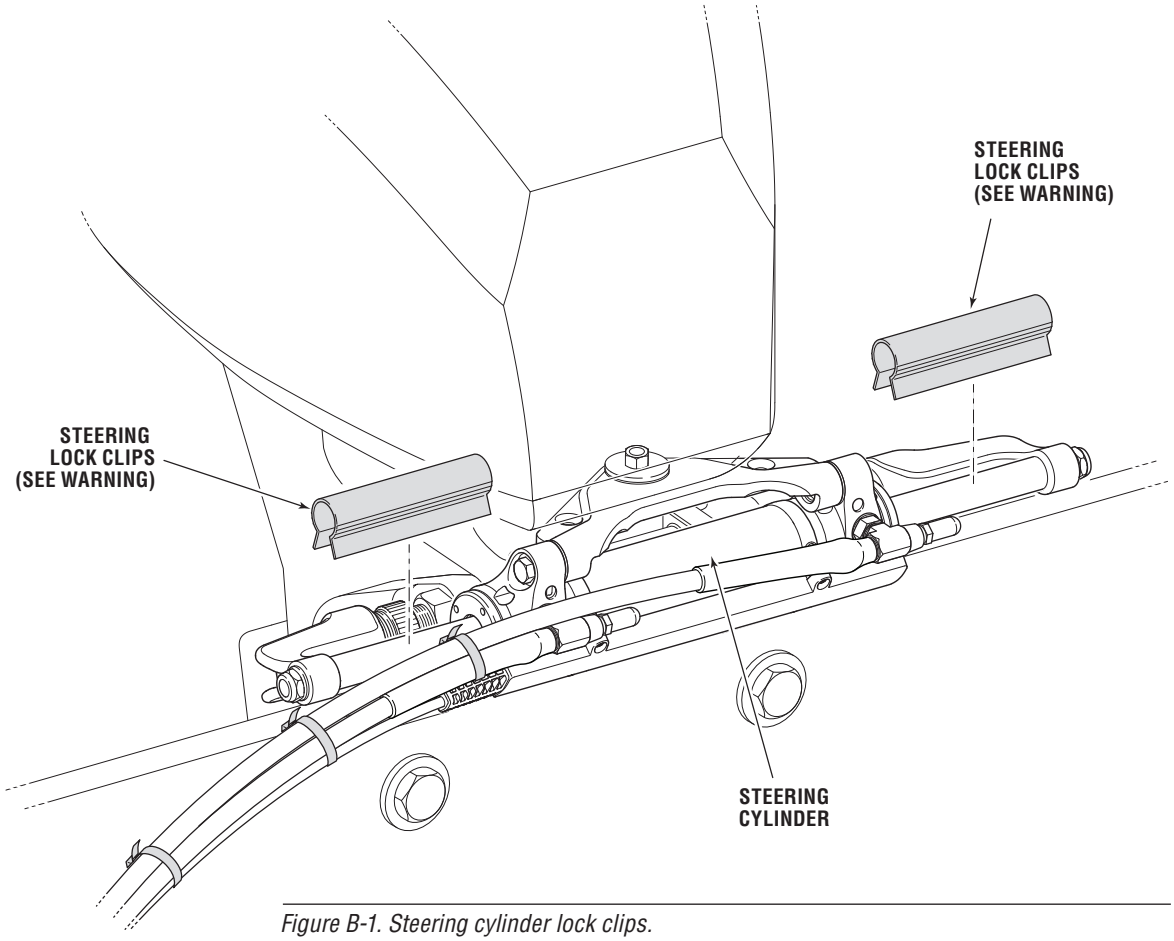

Figure B-1. Steering cylinder lock clips.

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SEASTAR SOLUTIONS
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